

# Type A11 High Performance Butterfly Valve

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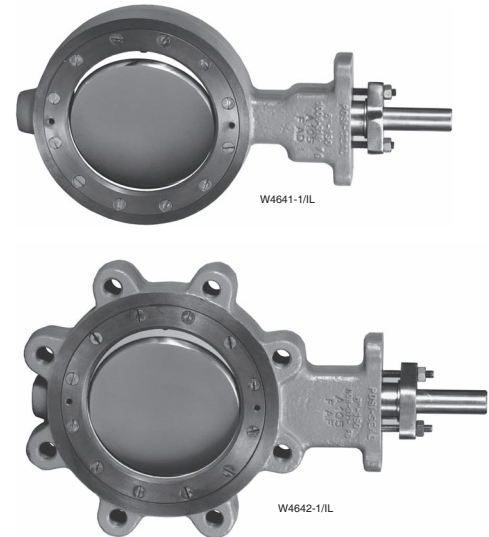


Figure 1. Type A11 Valve

and understanding the contents of this manual. If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

## Note

**Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.**

## Introduction

### Scope of Manual

This instruction manual includes installation, maintenance, and parts information for Type A11 High Performance Butterfly Valves (figure 1) in Class 150, 300, and 600. For Class 900 and 1500 valves, contact your Emerson Process Management™ sales office.

For information about the actuator and accessories, please refer to the separate instruction manuals for these items.

Do not install, operate, or maintain a Type A11 valve without first • being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance, and • carefully reading

## Description

Type A11 High Performance Butterfly Valves are available in either a flangeless wafer or a single flange design, with a variety of seal, valve body, and internal components. These valves feature a dynamic sealing design that is used in a variety of demanding applications.



Table 1. Specifications

### Available Configurations

#### Valve Sizes

**Class 150 and 300:** Size ■ 30, ■ 36, ■ 42 and ■ 48-inch

**Class 600:** Size ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, ■ 12, ■ 14, ■ 16, ■ 18, ■ 20 and ■ 24-inch

**Valve Body:** Wafer-style and single-flange style in Class ■ 150/150, ■ 150, ■ 300, ■ 600, ■ 900 and ■ 1500

### Maximum Inlet Pressure

Consistent with applicable ASME class pressure/temperature ratings per ASME B16.34 unless such ratings are limited by material temperature capabilities.

### Construction Materials

Refer to Bulletin 21.1:A11

### Disc Rotation

Clockwise (CW) to close

### Valve Body Classification

Face-to-face dimensions for Type A11 valve is in compliance with MSS SP-68 and API 609 standards.

Valve bodies are designed for installation between standard pipe flanges: for 3 inch through 24-inch sizes (ASME B16.5); for sizes greater than 24-inch (MSS SP-44 or API 605) as specified on valve order

### Seal Temperature Capabilities

**PTFE (Standard) Seal:** For application ranges from -62 to 232°C (-80 to 450°F)

**Phoenix III Seal:** For application ranges from -73 to 232°C (-100 to 450°F)

#### High-Temperature Seals:

*Standard:* Metal or NOVEX to 820°C (1500°F)

*Optional:* 17-4PH H1150M to 454°C (850°F)

#### Cryogenic Seals:

*CTFE:* -254 to 149°C (-425 to 300°F)

*NOVEX:* -254 to 260°C (-425 to 500°F)

### Approximate Weights

See tables 2 and 3

### Actuator Types Available

■ Locking-lever manual actuators, ■ worm-gear manual actuators, ■ spring-return pneumatic actuators, ■ double-acting pneumatic actuators, and ■ electric actuators

### ENVIRO-SEAL® Packing

This optional ■ PTFE or ■ graphite packing system provides improved sealing, guiding, and transmission of loading force to control liquid and gas emissions (see figure 7). See Bulletin 59.3:041 ENVIRO-SEAL Packing Systems for Rotary Valves for more information. Consult factory for larger sizes; they may require a special valve body.

Table 2. Approximate Weight for Size 30 through 72-Inch Valves

VALVE SIZE, INCHES	CLASS 150		CLASS 150/150		CLASS 300	
	Wafer	Single Flange	Wafer	Single Flange	Wafer	Single Flange
kg						
30	528	736	365	525	952	1406
36	806	1120	626	897	1315	1989
42	1302	1550	1100	1328	2263	2726
48	1904	2248	1604	1907	3056	4177
54	2197	2790	2150	2893	---	---
60	(1)	(1)	2417	3267	---	---
66	(1)	(1)	3903	5117	---	---
72	(1)	(1)	(1)	(1)	---	---
lbs						
30	1164	1623	805	1157	2100	3100
36	1778	2470	1380	1978	2900	4385
42	2871	3418	2425	2928	4989	6009
48	4198	4955	3537	4204	6737	9209
54	4844	6151	4747	6379	---	---
60	(1)	(1)	5329	7203	---	---
66	(1)	(1)	8604	11,282	---	---
72	(1)	(1)	(1)	(1)	---	---

1. Consult your Emerson Process Management sales office for information.

Table 3 Approximate Weight for Size 3 through 24-Inch Valves

VALVE SIZE	CLASS 600	
	Wafer Style	Single Flange
kg		
3	9	15
4	10	24
6	25	48
8	52	83
10	113	163
12	153	209
14	186	254
16	274	349
18	361	481
20	526	671
24	669	880
lbs		
3	20	32
4	23	52
6	54	106
8	115	183
10	249	360
12	337	460
14	410	560
16	605	770
18	796	1060
20	1160	1480
24	1475	1940

## Specifications

Specifications are shown in table 1 and the specifications for a given valve are stamped on a nameplate attached to the valve.

## Installation



### WARNING

**Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.**

**Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

**If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.**

### Note

**When installing a valve after it has been in long-term storage, cycle the valve at least ten times to re-energize the dynamic seal.**

Please contact your Emerson Process Management sales office if you have any questions about preparing a valve for storage or if you are planning to put into service a valve that has been stored for some time.

## Adjusting the Travel Stops

### CAUTION

**When using manual or power actuators, adjust the actuator travel stops so the disc stop in the valve body does not absorb the output of the actuator.**

**For actuators without travel stops, the actuator must be properly mounted to prevent it from driving the valve disc against the valve disc travel stop.**

**Failure to limit actuator travel as described in this section can result in damage to the valve shafts or other valve parts.**

### Note

**An "S" is visible on both the valve shaft and valve body. When the valve disc is closed, the "S" on the shaft aligns with the "S" on the valve body.**

1. Locate the actuator travel stop that establishes the closed position of the valve disc. When adjusting the travel stop make sure that the disc is from 0 to 0.76 mm (0 to 0.030 inch ) away from the internal stop in the valve body. This adjustment is necessary to be certain that the actuator output torque is fully absorbed by the actuator travel stop rather than the stop in the valve body.

For actuators without travel stops, the actuator must be properly mounted to prevent it from driving the valve disc against the valve disc travel stop.

# A11 Valve

1. To mount an actuator without travel stops, first, if necessary, remove the actuator from the valve. Then, position the valve disc from 0 to 0.76 mm (0 to 0.030 inch) away from the internal stop in the valve body.
2. Now, travel the actuator to the maximum position. Keep the actuator in the maximum travel position. Return the actuator to the valve, taking care not to disturb the position of the valve disc.
3. Mount the actuator on the valve using proper bolts with locking washers to achieve a secure fit.
4. Before installing the valve/actuator assembly in the process line, cycle the valve several times to be sure the valve disc returns to the proper position.

## Preparing for Installation



### WARNING

**If the Type A11 valve is equipped with a fail-open actuator, remove the actuator before installing the valve/actuator assembly or cycle the valve into the fully closed position. Then, to avoid possible personal injury or property damage, take appropriate steps to ensure that the actuator does not cause the valve to open during installation.**

1. If the valve and actuator have been purchased separately or if the actuator has been removed for storage, travel stop adjustment, or maintenance, mount the actuator before inserting the valve/actuator assembly into the line. Refer to the actuator instruction manual for mounting and adjustment procedures.

### CAUTION

**To avoid product damage, inspect the valve before installation for any damage or any foreign material that may have collected in the valve body. Also remove any pipe scale, welding slag, or other foreign material from the pipeline.**

2. Remove the protective end covers from the valve and inspect the valve body to be certain that it is free of foreign material. Also, be certain that adjacent pipelines are free of any foreign material, such as

pipe scale or welding slag that could damage the valve seating surfaces.



### WARNING

**The Type A11 valve is designed for use with the appropriate piping schedule for the ASME class. However, before putting the valve into operation, measure carefully to ensure disc rotation without interference from piping or flanges. Be certain to center the valve accurately to prevent interference of the disc with the flanges.**

- The edges of a rotating disc have a shearing effect that may result in personal injury. To help prevent such injuries, stay clear of the disc edges when rotating the disc.
- Damage to the disc will occur if any pipe flanges or piping connected to the valve interfere with the disc rotation path. If the piping flange has a smaller inner diameter than specified for schedule 80 piping, measure carefully to be certain the disc rotates without interference before putting the valve into operation.

3. Select the appropriate gaskets for the application. flexible graphite, spiral wound, or other gasket types, made to ASME B16.5 group or user's standard, can be used on Type A11 valves depending on the service conditions of the application. Note: spiral wound gaskets, when properly centered, will cover more than 60 percent of the gasket area at the retaining ring screws.

For metal-seated and cryogenic valve gasket recommendations, please contact your Emerson Process Management sales office.

4. Refer to the appropriate table for the quantity and size of flange bolts required (table 4 or 5) and proceed with the following instructions.

## Valve Orientation

Type A11 valve bodies are designed for installation with the shaft in any orientation around the pipeline: horizontal, vertical, or at an angle. However, when installing a Type A11 valve, please follow these recommendations.

Table 4. Stud Bolt and Cap Screw Data for Wafer Style Valves

<b>Class 150 &amp; Class 150/150</b>				
VALVE SIZE, INCHES	30	36	42	48
Number of Stud Bolts	24	28	32	40
Number of Cap Screws	8	8	8	8
Size-Diameter Inch – Thread	1-1/4 – 8	1-1/2 – 8	1-1/2 – 8	1-1/2 – 8
A-Length of Stud Bolts, Inch	15-1/2	18	20-3/4	22-3/4
B-Length of Cap Screw, Inch	4-1/2	5-1/4	6	6-1/2

<b>Class 300</b>				
VALVE SIZE, INCHES	30	36	42	48
Number of Stud Bolts	24	28	28	28
Number of Cap Screws	8	8	8	8
Size-Diameter Inch – Thread	1-3/4 – 8	2 – 8	1-5/8 – 8	1-7/8 – 8
A-Length of Stud Bolts, Inch	21-1/2	24-1/4	26	32
B-Length of Cap Screw, Inch	5-3/4	6-1/2	7-1/4	8

<b>Class 600</b>						
VALVE SIZE, INCHES	3	4	6	8	10	12
Number of Stud Bolts	8	8	12	12	12	16
Number of Cap Screws	---	---	---	---	8	8
Size-Diameter Inch – Thread	3/4 – 10	7/8 – 9	1 – 8	1-1/8 – 8	1-1/4 – 8	1-1/4 – 8
A-Length of Stud Bolts, Inch	7-1/4	8-1/2	10	11-1/2	13-1/2	14-3/4
B-Length of Cap Screw, Inch	---	---	---	---	4-1/4	4-1/2
VALVE SIZE, INCHES	14	16	18	20	24	
Number of Stud Bolts	15	16	16	20	20	
Number of Cap Screws	8	8	8	8	8	
Size-Diameter Inch – Thread	1-3/8 – 8	1-1/2 – 8	1-5/8 – 8	1-5/8 – 8	1-7/8 – 8	
A-Length of Stud Bolts, Inch	16	17-1/2	19	20-3/4	22-1/4	
B-Length of Cap Screw, Inch	4-1/2	5	5-1/2	5-3/4	6-1/4	

Table 5. Stud Bolt and Cap Screw Data for Single Flange Style Valves

<b>Class 150 &amp; Class 150/150</b>				
VALVE SIZE, INCHES	30	36	42	48
Number of Cap Screws	56	64	72	88
Size-Diameter Inch – Thread	1-1/4 – 8	1-1/2 – 8	1-1/2 – 8	1-1/2 – 8
B-Length of Cap Screw, Inch	4-1/2	5-1/4	6-1/4	6-1/2

<b>Class 300</b>				
VALVE SIZE, INCHES	30	36	42	48
Number of Cap Screws	56	64	64	64
Size-Diameter Inch – Thread	1-3/4 – 8	2 – 8	1-5/8 – 8	1-7/8 – 8
B-Length of Cap Screw, Inch	5-3/4	6-1/2	6	8-1/4

<b>Class 600</b>						
VALVE SIZE, INCHES	3	4	6	8	10	12
Number of Cap Screws	16	16	24	24	32	40
Size-Diameter Inch – Thread	3/4 – 10	7/8 – 9	1 – 8	1-1/8 – 8	1-1/4 – 8	1-1/4 – 8
B-Length of Cap Screw, Inch	2-1/2	3	3-1/2	4	4-1/4	4-1/2
VALVE SIZE, INCHES	14	16	18	20	24	
Number of Cap Screws	40	40	40	48	48	
Size-Diameter Inch – Thread	1-3/8 – 8	1-1/2 – 8	1-5/8 – 8	1-5/8 – 8	1-7/8 – 8	
B-Length of Cap Screw, Inch	4-1/2	5	5-1/2	5-3/4	6-1/4	

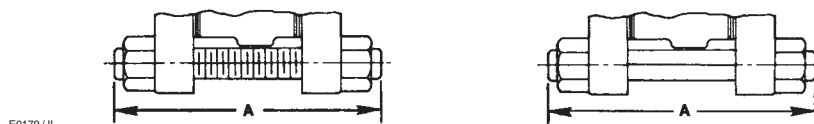


Figure 2. View of Stud Bolts

- In certain services (process fluids with high concentrations of entrained solids, abrasive slurries, or polymerizing media), valve performance will be enhanced by installing the valve with the shaft horizontal to the pipeline.

- Valves supplied for unidirectional shutoff should be installed with the high pressure at the back (waterway side) of the disc. A flow tag with an arrow is provided for proper installation.

The High Performance Butterfly Valve is designed to allow flow in either direction when in the open position. When in the closed position, high pressure should be applied to a specific side of the disc to provide best performance and optimal service life.

- Valves supplied for bidirectional shutoff, such as soft or Phoenix III, under normal operating conditions can (at different times) experience pressure in both directions; the highest of the two pressures should be exerted on the preferred side of the disc. If the two pressures are equal, then the one lasting the longest period of time should be applied to the preferred side. A flow tag with an arrow is provided for proper installation.

If you have questions about proper valve orientation in a specific application, contact your Emerson Process Management sales office.

## Installing the Valve



### WARNING

**Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.**

**To avoid personal injury or property damage resulting from the sudden release of pressure, do not install the valve assembly where service conditions could exceed the limits given in this manual, the limits on the appropriate nameplates, or the**

**matching pipe flange rating. Use pressure-relieving devices as required by government or accepted industry codes and good engineering practices.**

**Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

**If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.**

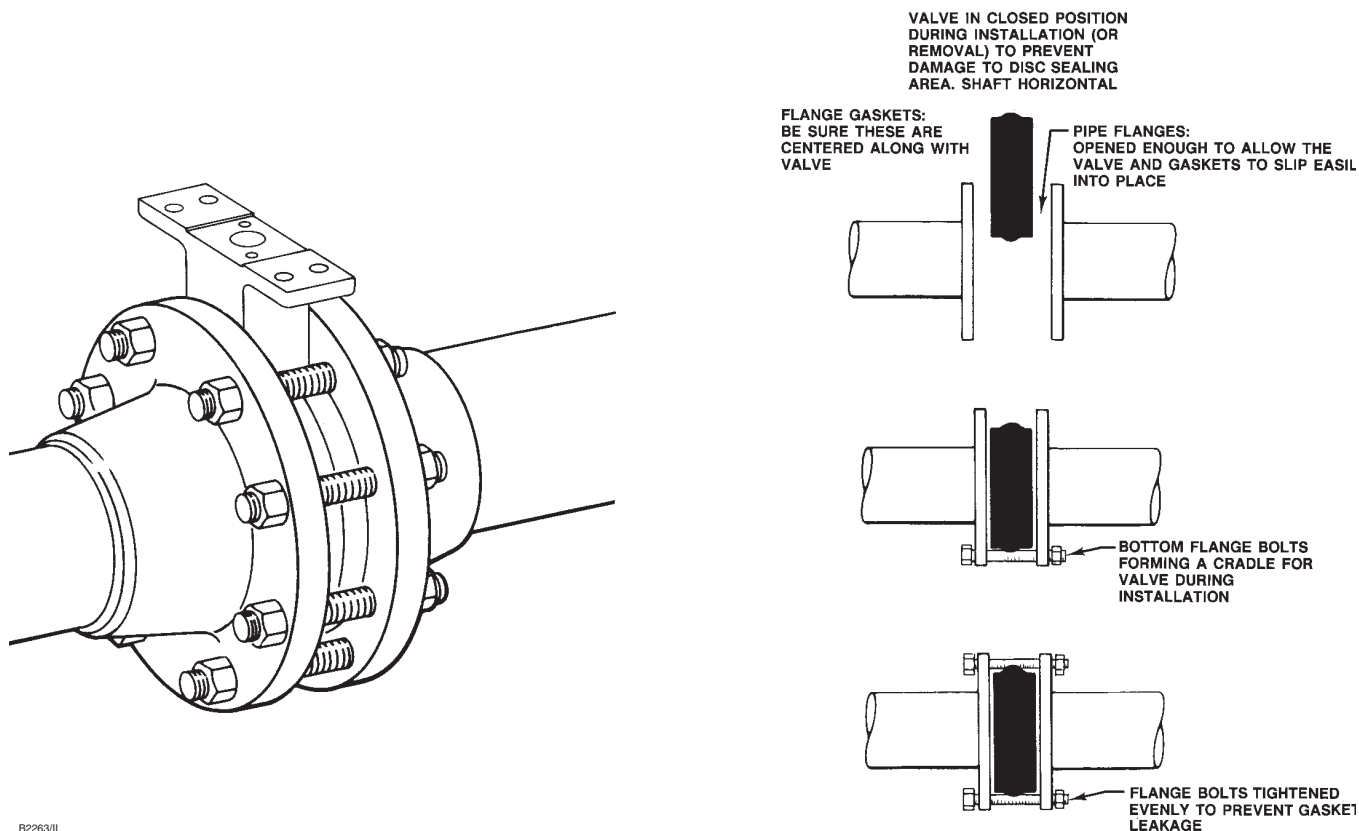
## CAUTION

**When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and end-user. Since some valve/body trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Emerson Process Management sales office.**

### For Wafer Style Valves:

1. See figure 3. Install the lower flange bolts first to form a cradle for the valve.
2. Properly orient the valve according to the specific application. Be sure the valve is placed in the line so the flow properly enters the valve. Then, install the valve and the gaskets between the flanges into the cradle formed by the flange bolts.
3. Install the remaining flange bolts, making sure that the gaskets are centered on the gasket sealing surfaces of the flange and valve body.
4. Tighten the flange bolts in an alternating criss-cross fashion to a torque value of one-fourth of





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Figure 3. Proper Installation Procedure

the final bolting torque. Repeat this procedure several times increasing the torque value each time by a fourth of the final desired torque. When the final torque value has been applied, tighten each flange bolt again to allow for gasket compression.

#### For Single Flange Valves:

1. Position the valve between the flanges. Be sure to leave enough room for the flange gaskets; then install the lower flange bolts.
2. Install the gaskets and align the valve and the gaskets.
3. Install the remaining bolts.
4. Tighten the flange bolts in an alternating criss-cross fashion to a torque value of one-fourth of the final bolting torque. Repeat this procedure several times increasing the torque value each time by a fourth of the final desired torque. When the final torque value has been applied, tighten each flange bolt again to allow for gasket compression.

#### Thrust Washers

Two thrust washers are used in valve sizes 10-inch and larger (Class 150), 8-inch and larger (Class 300), 8-inch and larger (Class 600). The thrust washers are located at the upper and lower bearing areas of the valve. Thrust washers must be installed before the disc is installed in the valve body.

#### Packing Adjustment and Shaft Bonding



#### WARNING

Personal injury could result from packing leakage. Valve packing was tightened before shipment; however, the packing might require some readjustment to meet specific service conditions. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

1. **For PTFE or graphite packing:** Tighten standard packing follower nuts only enough to

# A11 Valve

prevent shaft leakage. Excessive tightening of packing will accelerate wear and could produce higher rotating friction loads on the valve shaft. If necessary, refer to the Packing Maintenance section.

2. **For ENVIRO-SEAL Packing Systems:** These packing systems will not require this initial re-adjustment. Refer to the separate ENVIRO-SEAL Packing System for Rotary Valves Instruction Manual, Form 5305 for repair and adjustment procedures.

3. For hazardous atmosphere or oxygen service valves, read the following **Warning**, and provide the bonding strap assembly mentioned below if the valve is used in an explosive atmosphere.



## WARNING

The valve drive shaft is not necessarily grounded to the pipeline when installed. Personal injury or property damage could result, if the process fluid or the atmosphere around the valve is flammable, from an explosion caused by a discharge of static electricity from the valve components. If the valve is installed in a hazardous area, electrically bond the drive shaft to the valve body.

### Note

The packing is composed of all conductive packing rings (graphite ribbon packing) or partially conductive packing rings (carbon-filled PTFE female adaptor with PTFE V-ring packing or graphite-composition packing ring with PTFE/composition packing) to electrically bond the shaft to the valve for hazardous area service. For oxygen service applications, and hazardous area service where the standard packing doesn't provide sufficient shaft-to-valve body bonding, provide alternate shaft-to-valve body bonding according to the following step.

4. Attach the bonding strap assembly (key 131, figure 4) to the shaft with the clamp (key 130, figure 4).

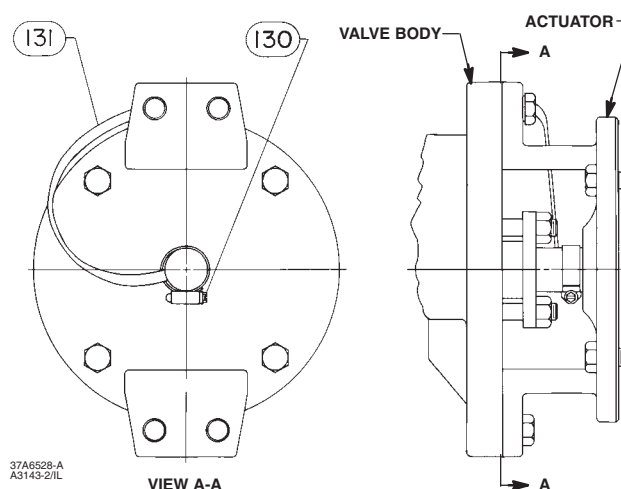


Figure 4. Optional Shaft-to-Body Bonding Strap Assembly

5. Connect the other end of the bonding strap assembly to the valve flange cap screws.

6. For more information, refer to the Packing Maintenance section below.

## Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions.



## WARNING

Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.
- Vent the power actuator loading pressure.



- Use lockout procedures to be sure the above measures stay in effect while you work on the equipment.
- Always wear protective gloves, clothing and eyewear when performing any maintenance operations to avoid personal injury.
- The valve packing area may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

## CAUTION

When using an actuator, the actuator travel stop (or actuator, for actuators without adjustable stops) must be adjusted so the disc stop in the valve does not absorb the output of the actuator. Failure to limit the actuator travel can result in damage to the valve, shaft(s), or other valve components.

## Removing the Valve

For field repair, remove the valve from the pipeline.



## WARNING

Using the procedures listed in the above WARNING, loosen the flange bolting that holds the valve. Make sure the valve cannot slip or twist while the bolting is being loosened and removed.

## CAUTION

Damage to the disc can occur if the disc is not closed when the valve is being removed from the pipeline. If

**necessary, stroke the actuator to place the disc in the closed position while removing the valve from the pipeline.**

7. Before removing the valve from the pipeline, make sure the valve disc is closed. See figure 3. Rotate the shaft clockwise until the disc makes contact with the internal stop or actuator travel stop (if still installed). The "S" stamped on the shaft should be aligned with the "S" on the valve body.
8. After removing the valve from the pipeline, move it to an appropriate work area. Remove the actuator from the valve.

## Packing Maintenance

The Type A11 valve is designed so the shaft packing can be replaced without removing the valve from the process pipeline. Refer to figure 8 for available packing configurations and figure 9 for part key numbers.

## CAUTION

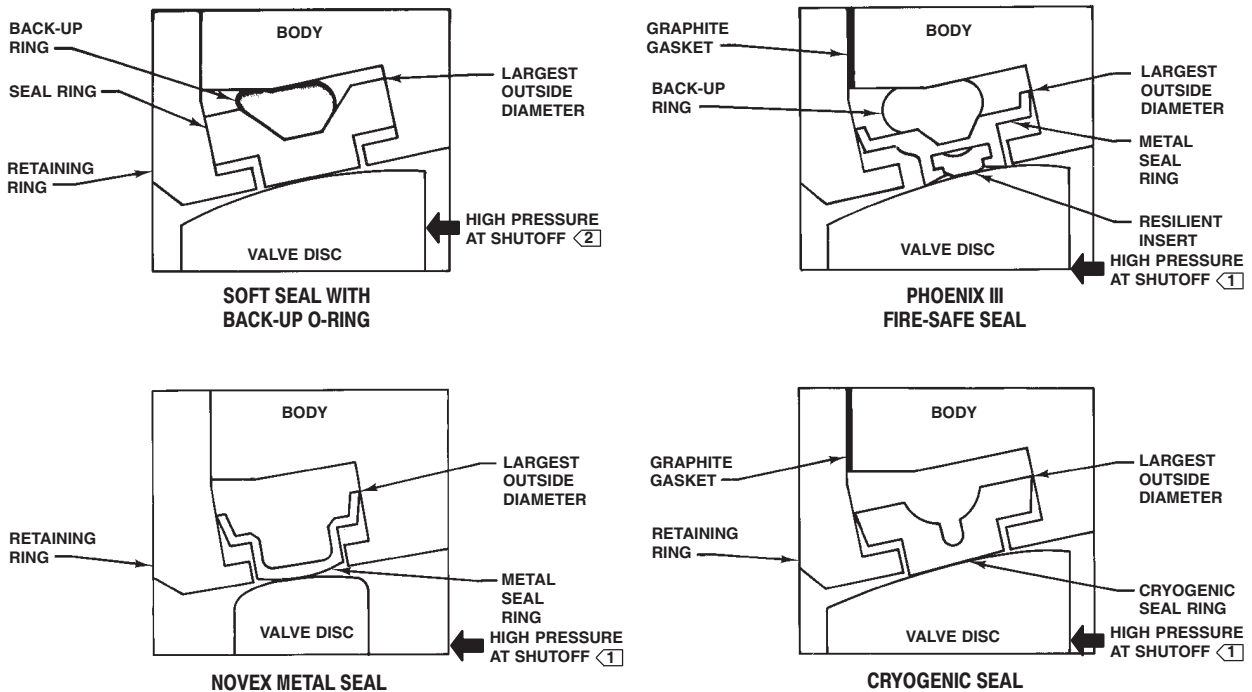
**The packing flange should be tightened only enough to prevent shaft leakage. Excessive tightening will only accelerate wear of the packing and could produce higher torques on the valve.**

In most cases, packing leakage can be eliminated by merely tightening the hex nuts located above the packing flange while the valve is in the pipeline. However, if leakage continues, the packing must be replaced.

1. Before loosening any parts on the valve, be sure the pipeline has been depressurized. Then, remove packing nuts (key 16), lift off the packing flange (key 12) and packing follower (key 13). The packing (key 14) is now accessible.
2. Use a packing extractor to remove packing. Insert the corkscrew-like end of the tool into the first piece of packing and firmly remove. Repeat this process until all has been removed.

## CAUTION

**Be careful when cleaning the packing bore. Scratches to the valve shaft (key 4) or inside diameter of packing bore may cause leakage.**



### NOTES:

- ① THIS UNIDIRECTIONAL SEAL MUST BE INSTALLED SO THAT THE RETAINING RING IS DOWNSTREAM FROM THE HIGH PRESSURE SIDE OF THE VALVE AT SHUTOFF, AS SHOWN.
- ② FOR THIS BIDIRECTIONAL SEAL, THE "PREFERRED" VALVE ORIENTATION PLACES THE RETAINING RING DOWNSTREAM FROM THE HIGH PRESSURE SIDE OF THE VALVE AT SHUTOFF.

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Figure 5. Seals

- Before installing new packing, clean the packing bore.
- Install new packing one ring at a time, using the packing follower as a driver. If split packing is used, stagger seams every 90°.
- Reinstall the packing follower and packing flange, secure nuts, and tighten as needed.

## Lantern Rings

Valves only have lantern rings if they are provided with purge fittings or lubrication fittings. Lantern rings are located either at the bottom of the packing or central packing area as noted in figure 8.

## Lubrication Fittings and Purge Connectors

These connections and/or fittings are located on the lower gasket retainer and packing area of valve

bodies. They are normally either 1/8 inch NPT or 1/4 inch NPT.

## Seal Maintenance

- After the valve has been removed from the line and the manual or power actuator has been removed, manually rotate the shaft (key 4) counter-clockwise until the disc has moved a full 180°. Note that the "S" on the shaft is 180° from the "S" on the valve body.
- Lay the valve flat on a work bench in a secure position with the retaining ring (key 2) and retaining ring screws (key 22) facing up. Use blocks or other appropriate techniques to support the valve. Remove all retaining ring screws.
- Remove the retaining ring by placing a retaining ring screw in each of the two retaining ring jack screw holes. With the appropriate tool, slowly rotate the screws until the retaining ring has been lifted from the valve body.

## CAUTION

**In the following step, use the appropriate tool to avoid damage to the seal or T-slot area of the valve.**

4. Different valve types have different seal designs and components. To see the appropriate seal, refer to figure 5. Insert the appropriate tool under the top edge of seal and gently pry the seal out. Take care not to damage the seal or T-slot area of the valve body. After the seal has been removed, clean the T-slot area, retaining ring and, if required, polish the disc thoroughly with fine steel wool or other appropriate material.

### **Soft Seal Installation**

1. Locate the replacement seal ring (key 8) and note the shape of the ring. The ring is wider across one edge diameter and narrower across the other edge diameter as shown in figure 6. Around the outside circumference is one wide groove.

Before installing the seal ring into the valve body, the backup ring (key 9) must first be placed onto the wide, outer groove of the seal ring.

2. The seal ring and backup ring assembly must be installed in the valve. The wider outside diameter of the seal ring goes into the T-slot area of the valve body, shown in figure 7. Start the wider diameter edge of the seal ring into the T-slot of the valve body using a blunt end screwdriver.

3. Carefully tuck the backup ring downward into the valve body T-slot until the seal ring and back-up ring are completely entrapped in the valve body T-slot.

4. When the seal is thoroughly seated, re-install the retaining ring and screws. Tighten the retaining screws just enough to eliminate vertical movement of the retaining ring. With the use of the blunt end tool, carefully tuck the lip of the seal ring under the retaining ring.

5. When the seal is under the lip of the retaining ring, tighten the screws according to standard procedures. Manually rotate the valve shaft clockwise 180° to return the disc to its closed position against the internal stop.

6. The final seating of the retaining ring screws can now be done. For the screw torque values, refer to table 6. The seal is now fully installed and the valve may be closed for installation or storage.

### **Metal and Phoenix III Seal Installation**

#### **For metal seal installation:**

Locate the replacement seal ring (key 8) and note the shape of the ring. The ring is wider across one edge diameter and narrower across the other edge diameter as shown in figure 6. Around the outside circumference is one wide groove.

Install the seal ring (key 8) into the valve body by first placing the wider outside diameter of the seal ring into the T-slot area of the valve body which is shown in figure 7. Metal seals without a back-up ring will fall into place. Metal seals with a back-up ring (key 9) will have to be installed following the instructions given below for the Phoenix III seal with back-up ring.

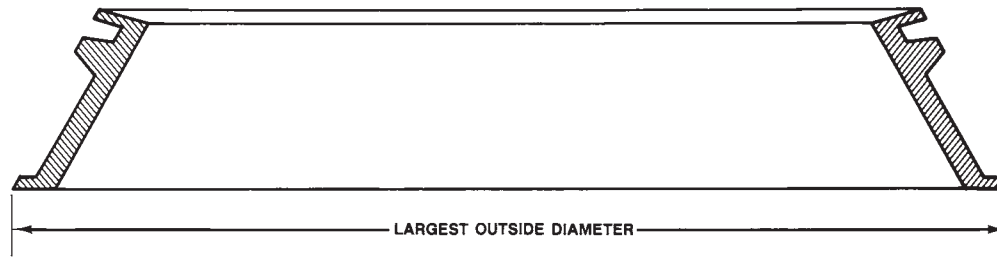
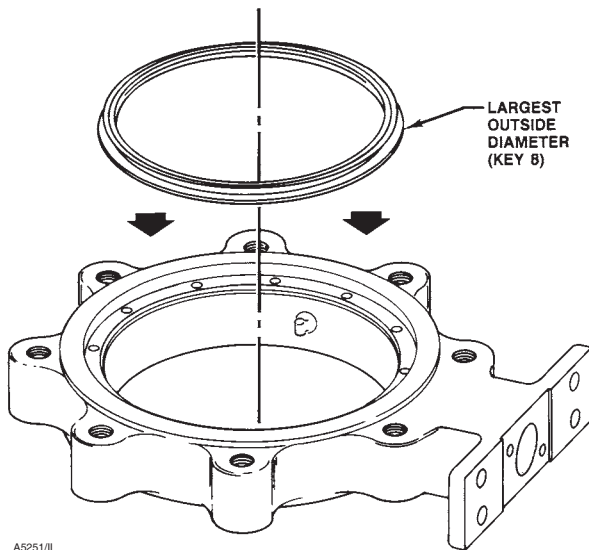


Figure 6. Typical Seal Ring (Sectional)



A5251/IL

Figure 7. Typical Seal Installation

## For Phoenix III seal installation:

1. Locate the replacement seal ring (key 8) and note the shape of the ring. The ring is wider across one edge diameter and narrower across the other edge diameter as shown in figure 6. Around the outside circumference is one wide groove.

Install the seal ring in the valve body by first placing the wider outside diameter of the seal ring, as marked in figure 6, into the T-slot area of the valve body which is shown in figure 7. Phoenix III seal rings without a back-up ring will fall into place. If the Phoenix III seal uses a back-up ring (key 9), the back-up ring will have to be installed after placing the seal ring in the valve using a blunt end screwdriver. Do not use the screwdriver or seal tool directly on the metal seat. Use a tool only on the backup ring.

2. With the seal ring inserted all the way around the valve body T-slot now lay the backup ring into the

opening between the valve body and the seal ring. Use the seal tool to apply pressure to the backup ring and carefully tuck the backup ring down into the T-slot between the valve body and the seal ring. Note: On larger valves, it may be more efficient to have someone hold down the seal ring while the backup ring is pushed into the T-slot.

3. Once the seal ring or seal and backup ring has been fully installed into the valve body T-slot, the retaining ring gasket (key 17) can be installed.

## CAUTION

**This gasket is a thin graphite material. Take care to avoid damaging the gasket. However, punch one initial screw hole through the gasket for alignment purposes.**

4. Install the retaining ring and align the screw holes in the retaining ring with the holes in the valve body. Install the first retaining ring screw through the punched hole in the ring gasket. Install the other ring screws by pushing the screws through the graphite gasket and threading them into valve body.

5. Tighten the retaining ring screws just enough to eliminate vertical movement of the retaining ring. Do not tighten the retaining ring screws.

## WARNING

**Avoid personal injury or property damage caused by the impact of a falling or tipping large valve. Large valves must be properly supported during maintenance.**

6. To complete this step, stand the valve up. Support the valve securely using methods appropriate for the valve size.

## CAUTION

**If a vise or other clamps are being used, be sure damage is not done to the flange gasket sealing area of the valve body.**

7. Manually rotate the valve shaft to turn the disc clockwise to meet the seal.

8. Tap the disc with a rubber mallet to drive it against the internal travel stop. When the disc makes contact with the stop, manually rotate the disc counter-clockwise back out of the seal to a 90° open position. Repeat steps 7 and 8 three times.

9. The final seating of the retaining ring screws can be done. For the screw torque values, refer to table 6. The seal is now fully installed and the valve may be closed for installation or storage.

### Cryogenic Seal Installation

1. Locate the replacement seal ring (key 8) and note the shape of the ring. The ring is wider across one edge diameter and narrower across the other edge diameter as shown in figure 6. Around the outside circumference is one wide groove.

**For Kel-F seals with aluminum backup rings only:** Now, locate the replacement V-ring. Please notice that the V-ring is similar in diameters to the seal ring. Place the V-ring down onto the seal ring with the larger diameter of the V-ring going first. Be sure the larger diameters on both rings are down.

2. **For all types:** Install the seal ring (or seal ring and V-ring) in the valve body by first placing the wider outside diameter of the seal ring into the T-slot area of the valve body. The seal ring with or without a back-up ring will fall into place.

3. Once the seal ring (or seal ring and V-ring) have been fully installed into the valve body T-slot, the retaining ring gasket can be installed.

## CAUTION

**This gasket is a thin graphite material. Take care to avoid damaging the gasket. However, punch one initial screw hole through the gasket for alignment purposes.**

4. Install the retaining ring and align the screw holes in the retaining ring with the holes in the valve body. Install the first retaining ring screw through the punched hole in the ring gasket. Install the other ring screws by pushing the screws through the graphite gasket and threading them into the screw holes in the valve body.

5. Tighten the retaining ring screws just enough to eliminate vertical movement of the retaining ring. Do not tighten the retaining ring screws.



## WARNING

**Avoid personal injury or property damage caused by the impact of a falling or tipping large valve. Large valves must be properly supported during maintenance.**

6. To complete this step, stand the valve up. Support the valve securely using methods appropriate for the valve size.

## CAUTION

**If a vise or other clamps are being used, be sure damage is not done to the flange gasket sealing area of the valve body.**

7. Manually rotate the valve shaft to turn the disc clockwise to meet the seal.

8. Tap the disc with a rubber mallet to drive it against the internal travel stop. When the disc makes contact with the stop, manually rotate the disc counter-clockwise back out of the seal to a 90° open position. Repeat steps 7 and 8 three times.

9. The final seating of the retaining ring screws can be done. For the screw torque values, refer to table 6. The seal is now fully installed and the valve may be closed for installation or storage.

### Valve Shaft/Disc Pin Unit Maintenance

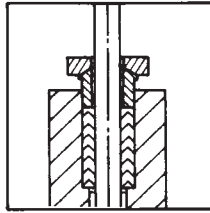
#### Valve Shaft/Disc Pin Unit Removal

1. Rotate the disc (key 3) 180° counterclockwise from the full closed position.

2. Place the open valve horizontally on a suitable work surface with the retaining ring (key 2) facing upward. Be sure to properly support the valve with blocks while the shaft is being removed.

THE FOLLOWING PACKING CONFIGURATIONS  
ARE AVAILABLE FOR SPECIFIC APPLICATIONS:

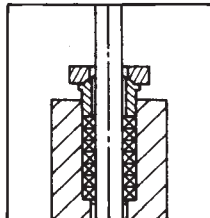
CODE 1 - PTFE - STD. ON CLASS 150  
AND 300 SOFT SEATED AND  
CRYOGENIC VALVES



STD. "V" TYPE  
PACKING

CODE 2 - GRAPHITE - STD. ON METAL  
SEATED, AND FIRE-SAFE  
VALVES

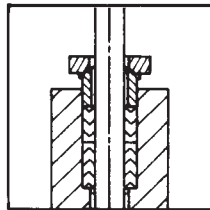
CODE 3 - PTFE - STD. ON CLASS 600  
AND UP SOFT SEATED  
VALVES



STD. SQ. TYPE  
JAM PACKING

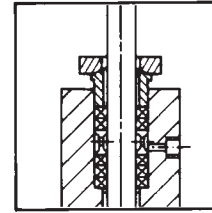
CODE 4 - PTFE

TO BE USED IN VACUUM SERVICE  
BELOW 20 MICRONS



STD. REVERSE "V"  
TYPE PACKING

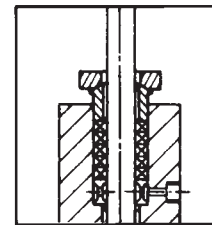
CODE 5 - GRAPHITE  
CODE 6 - PTFE



STD. SQ. TYPE JAM  
PACKING WITH  
LANTERN RING/  
BLEED-OFF  
CONNECTION

CODE 7 - GRAPHITE  
CODE 8 - PTFE

TO BE USED WHEN  
BEARING GREASE  
CONNECTIONS ARE  
REQUIRED.



STD. SQ. TYPE JAM  
PACKING WITH  
LANTERN RING/  
BEARING LUBRICATION  
CONNECTION

A5249/IL

Figure 8. Packing Configurations

### Note

**The disc must be removed from the waterway side of the valve body, which is the side opposite the T-slot area. Support the valve and disc so the disc can be easily removed from the valve when the shaft is removed.**

3. Use a pin extractor to remove the disc pins (key 6). Select the proper pin extractor tip with screws of proper thread size to match the thread size in the disc pins.
4. Screw the pin extractor tip into the pin as far as possible. With an upward, straight sliding motion, extract the pin. Repeat the same procedure for the other pins.

A threaded rod with an appropriate spacer and nut can also be used as an extractor tool. If using a threaded rod, choose a rod with threads that fit the inside threads of the pins. The rod should extend

several inches above the disc when screwed into a pin.

5. After screwing the rod into the pin, slide the spacer over the rod and pin. Thread the nut onto the rod and tighten. As the nut is tightened, it will drive the spacer against the disc and the increasing pressure will draw the pin from the disc.
6. Loosen the packing nuts (key 16).
7. Extract the shaft (key 4) by hand-pulling or by using the pin extractor screwed into the end of the shaft.

### Note

**Valves with a two-piece shaft use a gasket retainer, which must be removed before removing the lower shaft.**



Table 6. Torque Values for Fasteners

Fastener Nominal Size	N•m	In•lb	Ft•lb
#10	4	35	---
1/4	9	81	---
5/16	19	167	---
3/8	33	295	---
7/16	53	---	39
1/2	80	---	59
9/16	117	---	86
5/8	161	---	119
3/4	286	---	211
7/8	447	---	330
1	651	---	480
1-1/8	837	---	617

## CAUTION

**In the following step, remove the disc from the waterway side of the valve to avoid damage to the disc or T-slot area of the valve.**

8. Remember: the disc must be removed from the waterway side of the valve. Do not try to force the disc through the seal side of the valve. This could cause severe damage to the disc and T-slot area.

After removing the shaft, remove the disc.

### Valve Shaft/Disc Pin Unit Installation

#### Note

**Replacement disc and shaft(s) are provided as a matched set. When replacing either the disc or shaft(s), a matched set is required.**

To replace the disc pin assembly (key 6), reverse the removal steps used above.

Before placing disc into a valve body, properly align the top of the disc with the top of the valve. A "T" is stamped on the disc to indicate alignment. Be sure holes in the shaft are exactly aligned with the holes in the disc before re-installing pins. After pins are fully seated in the disc, use a punch or small chisel to stake the pins at three points. This will prevent the pins from working free and out of the disc due to vibration.

### Gasket Retainer

When two-piece shafts are used, a gasket retainer assembly must be used. The gasket is held in place by a gasket retainer and four hex head bolts and lockwashers. When re-assembling the valve, this gasket should always be replaced. Be sure the gasket is centered over the shaft bore before retightening bolts. Tighten down bolts evenly in a cross over pattern or in a star pattern. Refer to table 6 for proper torque values.

### Bearing Maintenance

#### Bearing Removal

To get access to the bearings (key 10), the disc and shaft assembly (keys 3, 4 and 5) must be removed from the valve. The bearings (key 10) may be removed by using a brass drift punch and lightly tapping them out. In valves without lower bonnets, the lower bearing is removed by grasping it and pulling upwards. Also, cryogenic valves have an outboard bearing under the packing. Refer to the Packing Maintenance section for instructions.

#### Bearing Installation

Before installation of the bearings, bearing bores should be solvent cleaned and bearings will slip in.

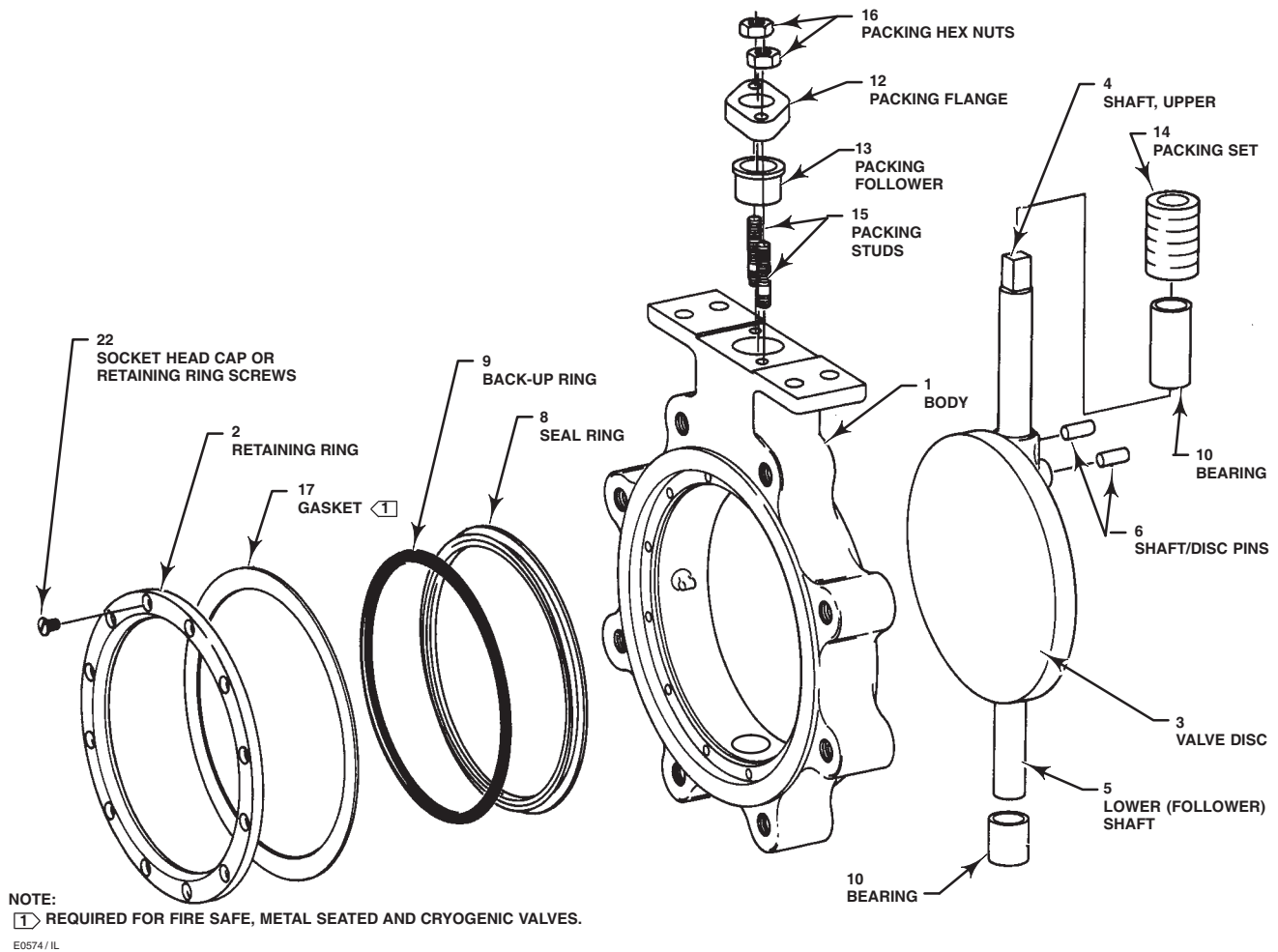


Figure 9. Typical Type A11 Valve Assembly

## Parts Ordering

When corresponding with your Emerson Process Management sales office about a Type A11 valve, please mention the valve serial number which is stamped on the nameplate and the part number from the following list.



### WARNING

Use only genuine Fisher® replacement parts. Components that are not supplied by Emerson Process Management should not, under any

circumstances, be used in any Fisher valve, because they will void your warranty, might adversely affect the performance of the valve, and could give rise to personal injury and property damage.

### Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

## Parts List

All items listed as being 3 through 24-inch are for the Class 600 valves only. The 30 through 48-inch items are for 150/150, 150 or 300 Class valves, as specified.

### Note

Part numbers are shown for recommended spares only. For other part numbers, contact your Emerson Process Management sales office.

Key	Description	Part Number
1	Valve Body If you need a valve body as a replacement part, order the valve size, Class, serial number, and desired material. Contact your Emerson Process Management sales office.	
2	Retaining Ring	
7*	Key (Not Shown)	
	6-inch	V116663X012
	8- & 10-inch	V116663X012
	12-inch	V116197X012
	30- & 36- inch Class 150/150	V171330X012
	42-inch Class 150/150, 30-, 36- & 48-inch Class 150 & 30-inch Class 300	13B2601X012
	36-inch Class 300	13B3422X012
	42-inch Class 150	V148564X012
	42-inch Class 300	V178488X012
8*	Seal Ring	See following table
9	Back-up Ring	
10*	Bearing	See following table
11*	Thrust Bearing (Not Shown)	See following table
12	Packing Flange	
13	Packing Follower	
14*	Packing Set	See following table
15	Stud	
16	Hex Nut	
17*	Gasket (Retainer Ring) w/Metal and Phoenix III Seals	
	3-inch	V163883X012
	4-inch	V164130X012
	6-inch	V163884X012
	8-inch	V168656X022
	10-inch	V164111X012
	12-inch	V164217X012
	14-inch	V164128X012
	16-inch	V164218X012
	18-inch	V164129X012
	20-inch	V163952X012

Key	Description	Part Number
17*	Gasket (Retainer Ring) w/Metal and Phoenix III Seals (cont)	
	24-inch	V164220X012
	30-inch Class 150	V168292X012
	30-inch Class 150/150	V124868X012
	30-inch inch Class 300	V124882X012
	36-inch Class 150 & 150/150	V124869X012
	36-inch Class 300	V124883X012
	42-inch Class 150 & 150/150	V124872X012
	42-inch Class 300	V124881X012
	48-inch Class 150 & 150/150	V125088X012
	48-inch Class 300	V124874X012
	Oxygen Service	
	3-inch	V163883X022
	4-inch	V164130X022
	6-inch	V163884X022
	8-inch	V168656X012
	10-inch	V164111X022
	12-inch	V164217X022
	14-inch	V139619X042
	16-inch	V164218X022
	30-inch Class 150	V168292X022
	30-inch Class 150/150	V124868X022
	30-inch Class 300	V124882X022
	36-inch Class 150 & 150/150	V124869X022
	36-inch Class 300	V124883X022
	42-inch Class 150 & 150/150	V124872X022
	42-inch Class 300	V142881X022
	48-inch Class 150 & 150/150	V125088X022
	48-inch Class 300	V124874X022
18*	Gasket Retainer (Not Shown)	
	8-inch	V112278X012
	10-inch	V110620X012
	12-inch	V110621X012
	30 & 36-inch	V111679X012
	42-inch	V139469X012
	48-inch	V121625X012
19*	Retainer Gasket (not shown)	See following table
20	Lockwasher, retaining ring assembly S31600	
20	Lockwasher, packing assembly	
21	Hex Head Bolt (Not Shown)	
22	Socket Head Cap or Retaining Ring Screws	
24	Nameplate (Not shown)	
26	Packing Spacer (Not shown)	
27	Drive Screw (Not Shown)	
28*	Disc/Shaft Assembly	See following table
29	Label	
33	Flow Arrow (Not Shown)	
- - -	Line Bolting	

# A11 Valve

## ENVIRO-SEAL® Packing Parts

Parts shown are used in standard and NACE constructions.

100	Stud	
101	Hex Nut	
102	Packing Flange	
103	Spring Pack	
105*	Packing Set	
	Use w/PTFE packing	
	3-inch	12B9122X012
	4-inch	12B7414X012
	6-inch	12B9078X012
	8-inch	12B7462X012
	10-inch	13B9155X012
	12-inch	14B3647X012
	14-inch	12B7782X012
	16-inch	14B5652X012
	18-inch	14B5730X012
	Use w/Graphite packing	
	3-inch	13B8816X022
	4-inch	13B8816X052
	6-inch	13B8816X102
	8-inch	13B8816X142
	10-inch	14B3541X032
	12-inch	14B3541X052
	14-inch	14B3541X042
	16-inch	14B3541X062
	18-inch	14B3541X072

Key	Description	Part Number
106*	Anti-Extrusion Ring (2 req'd)	
	Use w/PTFE packing	
	3-inch	12B9121X012
	4-inch	12B7418X012
	6-inch	12B9084X012
	8-inch	12B7466X012
	10-inch	13B9159X012
	12-inch	14B3642X012
	14-inch	12B7783X012
	16-inch	14B5656X012
	18-inch	14B5734X012
107	Packing Box Ring	
111	Tag	
112	Cable Tie	
113	Lubricant	

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# A11 Valve

## Key 8\* Seal Ring

VALVE SIZE, INCHES	CLASS	MATERIAL			
		ETFE	Metal Seal Ring S31600	Metal Seal Ring S17400 H1150M	Phoenix III Metal Seal Ring
3	600	V111012X012	V110605X012	V110605X022	V114478X012
4		V111035X012	V149609X012	V149609X022	V114480X012
6		V118868X012	V118864X012	V118864X022	V119985X012
8		V111037X012	V141699X012	V141699X022	V142361X012
10		V111038X012	V148798X012	V148798X022	V143266X012
12		V111039X012	V149262X012	V149262X022	V143160X012
14		V111979X012	V111992X012	V111992X022	V114495X012
16 <sup>(1)</sup>		V130804X012	V135726X012	---	V149048X012
18		V111985X012	V149399X012	V149399X022	V114501X012
20		V111988X012	V111995X012	V111995X022	V149319X012
24		V111991X012	V111996X012	V111996X022	V114509X012
42	150/150	---	13B1554X012	---	---
42	150	---	13B1571X012	---	---
48	150/150	---	13B1555X012	---	---
48	150	---	13B1572X012	---	---
VALVE SIZE, INCHES	CLASS	MATERIAL			
		PTFE	NOVEX	Phoenix III Metal Seal Ring	Phoenix III Metal Seal Ring for Oxygen Service
30	150/150	V113145X012	V161260X012	V114471X012	V114471X022
30	150	V113350X012	V159048X022	V114472X012	V114472X022
30	300	V113353X012	13B2252X042	V114473X012	V114473X022
36	150/150	V113355X012	V143195X012	V114474X012	V114474X022
36	150	V113358X012	V159051X012	V143197X012	V143197X012
36	300	V113361X012	13B3645X012	V141335X012	V141335X022
42	150/150	V130753X012	---	V126141X012	V126141X022
42	150	V130775X012	---	V127525X012	V127525X022
42	300	V130093X012	---	V130184X012	V130184X022
48	150/150	V130772X012	---	V119520X012	V119520X022
48	150	V136069X012	---	V129715X012	V129715X022
48	300	V130445X012	---	13B2032X012	13B2032X022

1. The part number for 16-inch, Metal Seal Ring – S31600/ETFE is V161370X012

# A11 Valve

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### Keys 10\* and 11\* Bearing and Thrust Bearing

VALVE SIZE, INCHES	CLASS	QUANTITY	BEARING MATERIAL			
			PEEK	S31600	Bronze	Alloy 6
Key 10 Bearing						
3	600	3	13B1509X012	V110614X022	V110614X022	V110614X042
4		3	13B1660X012	V166684X012	V166684X032	V166684X052
6		3	13B1489X012	V168505X012	V168505X022	V168505X052
8		4	13B1851X012	V174342X012	V174342X022	V174342X042
10		4	13B1738X012	V110616X012	V110616X022	V110616X042
12		4	V168186X012	V171724X012	V171724X032	V171724X042
14		4	V168187X012	V170455X012	V170455X032	- - -
16		4	V168188X012	V1316999X052	V131699X032	- - -
18		4	V168189X012	V131703X042	V131703X052	- - -
20		6	13B1973X012	V112012X012	V112012X022	- - -
24		4	13B2776X012	V112014X012	V112014X022	- - -
30	150/150	4	V127742X032	13B1585X012	V127742X042	V127742X052
30	150	4	V167654X012	V171363X012	V131010X012	V131010X042
30	300	4	13B1968X012	V175126X012	V175126X032	V175126X042
36	150/150	4	13B1969X012	V176032X012	V176032X032	V176032X022
36	150	4	13B1970X012	V171361X012	V171361X032	V171361X052
36	300	4	13B1971X012	V174912X042	V174912X032	V174912X012
42	150/150	4	13B1972X012	V114716X012	V114716X022	V114716X052
42	150	6	13B1973X012	V112012X012	V112012X022	V112012X052
42	300	6	13B1974X012	V130181X012	V130181X042	V130181X032
48	150/150	6	13B1768X012	V171361X012	V171361X032	V171361X052
48	150	4	13B1975X012	V171365X012	V171365X032	V171365X052
48	300	10	13B1976X012	V117028X012	V117028X042	V117028X032
Key 11 Thrust Bearing						
8	600	2	13B1850X012	V174343X012	V174343X022	V174343X052
10		2	13B1739X012	V110446X012	V110446X022	V110446X042
12		2	V168181X012	V131681X022	V131681X042	V131681X052
14		2	13B2777X012	V127739X032	V127739X042	- - -
16		2	13B2778X012	V137374X032	V137374X012	- - -
18		2	13B2779X012	V112445X022	V112445X012	- - -
20		2	13B2780X012	V112016X012	V112016X022	- - -
24		2	13B2781X012	V157177X022	V157177X012	- - -
30	150/150	2	13B1584X012	V171360X012	V171360X022	V171360X042
	150	2	V167656X012	V171364X012	V171364X022	V171364X042
	300	2	13B1959X012	V175127X012	V175127X022	V175127X042
36	150/150	2	13B1960X012	V136767X022	V136767X032	V136767X042
	150	2	13B1961X012	V171362X012	V171362X022	V171362X052
	300	2	13B1962X012	V116148X012	V116148X022	V116148X052
42	150/150	2	13B1963X012	V125303X012	V125303X022	V125303X052
	150	2	13B1964X012	V137636X012	V137636X042	V137636X052
	300	2	13B1965X012	V130097X012	V130097X032	V130097X042
48	150/150	2	13B1769X012	V113699X012	V113699X042	V113699X032
	150	2	13B1966X012	V151148X012	V151148X042	V151148X052
	300	2	13B1967X012	V117029X012	V117029X032	V117029X042



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**A11 Valve**

## Key 14\* Packing Set

VALVE SIZE, INCHES	CLASS	MATERIAL		
		PTFE V-Ring	Graphite	Graphite with Oxygen Service
3	600	V113124X022	V113124X012	V113124X032
4		V113128X022	V113128X012	V113128X032
6		V111025X022	V111620X012	V111025X032
8		V110456X012	V110456X022	V110456X032
10		V111028X032	V111028X012	V111028X022
12		V111696X032	V111696X012	V111696X022
14		V111442X032	V111442X012	V111442X022
16		V111705X032	V111705X012	V111705X022
18		V111709X032	V111709X012	V111709X022
20		V125909X022	V125909X012	---
24		V112041X012	V112041X022	---
30	150/150	V111699X012	V111442X012	V111442X022
30	150	V111704X012	V111705X012	V111705X022
30	300	V121593X012	V115138X012	V115138X022
36	150/150	V117210X012	V116838X012	V116838X022
36	150	V121811X012	V129596X012	V129596X022
36	300	V122149X012	V115155X012	V115155X022
42	150/150	V114721X012	V126139X012	V126139X022
42	150	V112038X012	V112039X012	V112039X022
42	300	V130100X012	V147154X012	V147154X022
48	150/150	V119322X012	V115058X012	V115058X022
48	150	V126979X012	V119524X012	V119524X022
48	300	V130450X012	V147480X012	V147480X022

# A11 Valve

## Instruction Manual

Form 5338

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Key 19\* Retainer Gasket (not shown)

VALVE SIZE, INCHES	CLASS	MATERIAL		
		Standard Service Soft Seal	Standard Service Metal/Phoenix III Seal	Oxygen Service with Soft or Metal Seals
8	600	V135212X022	V135212X012	V135212X032
10		V135209X022	V135209X012	V135209X032
12		V148910X032	V148910X012	V148910X022
14		V139619X022	V139619X012	V139619X032
16		V112057X012	V112057X022	V112057X032
18 & 20		V112058X012	V112058X022	---
24		V144925X012	V144925X022	---
30	150/150	V124603X022	V124603X012	V124603X032
30	150	V135139X022	V135139X012	V135139X032
30	300	V148908X022	V148908X012	V148908X032
36	150/150	V135139X022	V135139X012	V135139X032
36	150	V135138X022	V135138X012	V135138X032
36	300	V148909X022	V148909X012	V148909X032
42	150 & 150/150	V135211X022	V135211X012	V135211X032
42	300	V147155X022	V147155X012	V147155X032
48	150/150	V135138X022	V135138X012	V135138X032
48	150	V148908X022	V148908X012	V148908X032
48	300	V171283X022	V171283X012	V171283X032

# Instruction Manual

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# A11 Valve

Key 28\*, Disc-Shaft-Pin Assembly<sup>(1)</sup> Square Connection [Disc (key 3), Shaft (key 4), Follower Shaft (key 5), and Pin (key 6)]

VALVE SIZE, INCHES	SHAFT MATERIAL <sup>(2)</sup>	DISC MATERIAL		
		CF8M Chrome Coated	CF8M ENC	CF8M Hard Face
3	S17400 H1025	V138800X092	V138800X022	V138800X032
	N05500	V138800X112	V138800X052	V138800X142
	S17400 H1150M	V138800X102	V138800X012	V138800X152
4	S17400 H1025	V161632X082	V161632X042	V161632X022
	N05500	V161632X102	V161632X012	V161632X122
	S17400 H1150M	V161632X092	V161632X152	V161632X142
6	S17400 H1025	V161647X092	V161647X052	V161647X042
	N05500	V161647X122	V161647X132	V161647X022
	S17400 H1150M	V161647X102	V161647X012	V161647X152
8	S17400 H1025	V145082X102	V145082X012	V145082X062
	N05500	V145082X122	V145082X052	V145082X142
	S17400 H1150M	V145082X112	V145082X032	V145082X152
10	S17400 H1025	V126325X082	V126325X012	V126325X032
	N05500	V126325X102	V126325X052	V126325X152
	S17400 H1150M	V126325X092	V126325X042	V126325X062
12	S17400 H1025	V126329X042	V126329X012	V126329X032
	N05500	V126329X062	V126329X112	V126329X122
	S17400 H1150M	V126329X052	V126329X132	V126329X142

1. Part numbers provided in this table are assembly numbers including keys 3, 4, 5 and 6. The pin (key 6) is listed as a spare part and can be ordered without the assembly.  
2. The same shaft material is used in one or two shaft valve assemblies.

Key 28\*, Disc-Shaft-Pin Assembly<sup>(1)</sup> Keyed Connection [Disc (key 3), Shaft (key 4), Follower Shaft (key 5), and Pin (key 6)]

VALVE SIZE, INCHES	SHAFT MATERIAL <sup>(2)</sup>	DISC MATERIAL		
		CF8M	CF8M ENC	CF8M Chrome Coated
30 Class 150	S17400 H1025	13B3474X022	13B3474X102	13B3474X062
	N05500	13B3474X212	13B3474X222	13B3474X172
	S17400 H1150M	13B3474X152	13B3474X162	13B3474X052
36 Class 150	S17400 H1025	13B3529X042	13B3529X062	13B3529X022
	N05500	13B3529X172	13B3529X182	13B3529X192
	S17400 H1150M	13B3529X102	13B3529X122	13B3529X132

1. Part numbers provided are assembly numbers including keys 3, 4, 5 and 6. The pin (key 6) is listed as a spare part and can be ordered without the assembly.  
2. The same shaft material is used in one or two shaft valve assemblies.

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